Practical Points in Anesthesia

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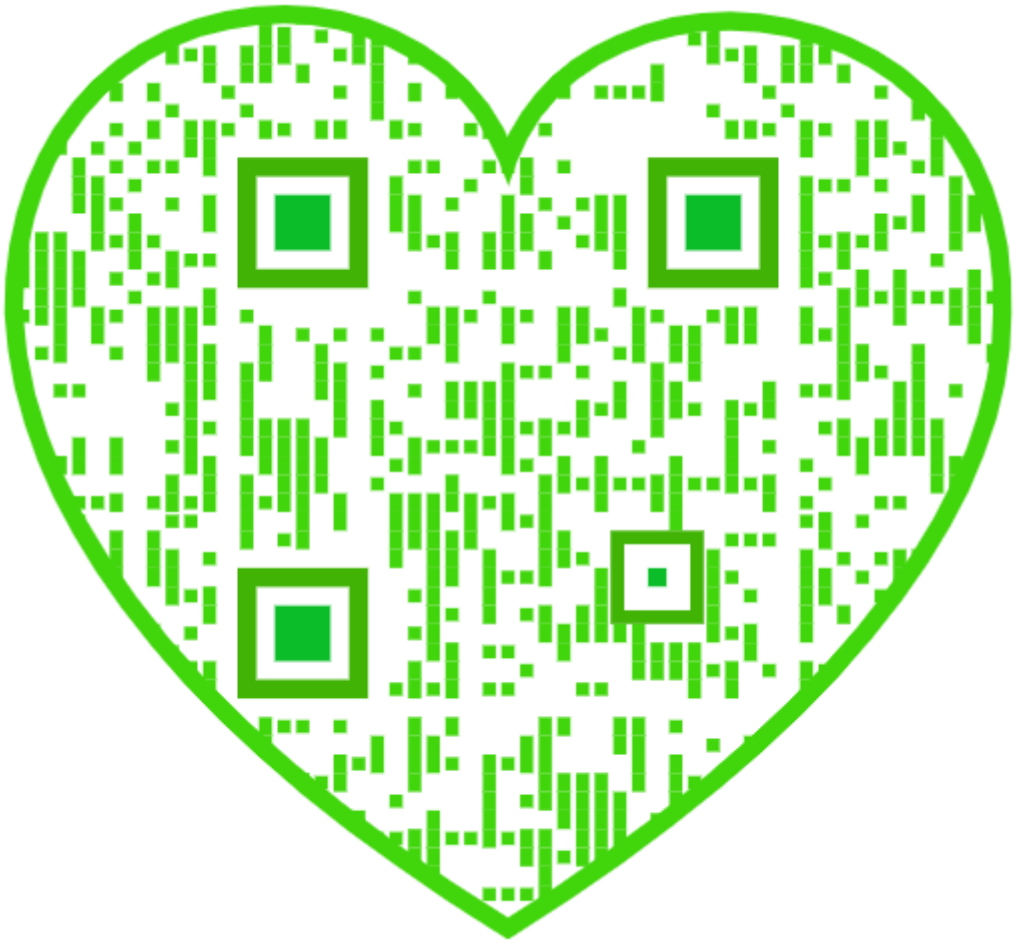

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PRACTICAL POINTS IN ANESTHESIA

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By

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PREFACE

I have tried to present some of my impressions on the correct use of chloroform and ether and of a very useful combination of these—anaesthol. No doubt, my observations and conclusions will have to be modified in many details by the experiences of others. I have merely voiced a simple and coherent working theory, which has gradually forced itself upon me as my views on the practice of anesthesia have become a little broader and more comprehensive.

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PRACTICAL POINTS IN ANESTHESIA

The Induction of Anesthesia.

I can spare the reader the ordeal of many words by beginning in a concrete way with the outline of a system of anesthesia that is now largely followed at the German Hospital, New York City.

The Mask

The Schimmelbusch mask is used; this fits the face and is large enough to include the bridge of the nose and prominence of the chin. It is covered with a piece of thin flannel, and, over this, impermeable cloth in the center of which a lozenge-shaped fenestra (1½"x1") has been cut. In the upper half of this little window with the flannel pane, on the inside of the mask, a small wad of gauze is fastened. The mask is then complete and *can be used for administering any anesthetic by the drop method—chloroform, anaesthol*

or ether. In giving ether one makes use of the upper half of the fenestra with its separate ether pad; while chloroform and anaesthol are given to advantage through the lower portion. The chin, cheek and bridge of the nose are anointed with a little white vaseline at the line of contact with the mask, and then the latter is allowed to rest lightly on the face of the patient for a few moments, until he can reconcile himself to the strange procedure, and resumes his normal breathing. There must be absolute quiet. The anesthetist alone may speak when he deems fit.

The Induction

The beginning is made with anaesthol or chloroform drop by drop. The slightest objection on the part of the patient that the vapors are too strong must be considered; irritation of the throat, slight coughing, all merely emphasize that the introduction must be very gradual. If the patient is solicitous about the efficacy of the anesthetic he should be assured that there is no hurry, and he should be enjoined to take deeper breaths, if he breathes too lightly. As long as the pa-

tient is conscious he will respond to the injunction to take a deep breath; if he does not respond to this request he has reached the *stage of unconsciousness—the state of primary anesthesia.*

Primary Anesthesia

Sometimes a remarkable calm, a period of relative apnea, *precedes* the stage of excitement. At other times, this stage ushers the patient *directly* into the state of complete anesthesia. There need be no stage of excitement at all. This is especially true if morphine has been administered hypodermatically before narcosis, and if the induction of the anesthetic is cautious and gradual.

The surgical degree, the state of complete anesthesia, is announced by the respiration when it assumes the more or less well marked snoring character of one who is fast asleep.

Surgical Degree

In the German Hospital system the patient, male or female, is given a quarter of a grain of morphine sulphate hypodermatically half an hour before narcosis. The anesthesia is always induced with anaesthol or chloroform. *Where much blood is lost or the operation is*

of very long duration one may at any time make the transition to ether by the drop method without changing the mask. As a rule, a morphine-anaesthol narcosis is given with a few drops of ether now and then (ether feeding), when a little stimulation is indicated. In a small number of cases, among them choledochotomies and other operations on the gall-bladder, particularly where there is jaundice, the morphine-anaesthol introduction is followed by the ether drop method.

Cardiac Collapse.

Cardiac collapse is fortunately uncommon. It usually occurs during the induction of anesthesia. Suddenly there is a marked pallor of the face and the pulse becomes weak. It happens in chloroform, and occasionally in anaesthol narcosis. When such a tendency is discovered *ether* should be given by the drop method.

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Gradual induction of anesthesia until the patient's tolerance to chloroform is ascertained, is of cardinal importance.

Respiratory Collapse.

Obstructed breathing developing during the induction of narcosis is apt to be due to *crowding*. If obstructed breathing becomes manifest later, that is, during the course of the operation, it may be due to *inhibitory reflex elicited by the surgeon.* Traction on the gall bladder or mesentery will sometimes evoke a peculiar noisy breathing which does *not* mean that the patient is insufficiently under the influence of the anesthetic. The breathing becomes normal and unrestrained as soon as the surgeon desists from these vigorous manipulations.

Crowding

Probably the most common of mistakes is crowding the anesthetic. The anesthetist becomes aware of faint, high pitched notes in the breathing—the beginning of obstructed

respiration. He examines the lid and corneal reflex and these convince him that the patient is in the state of *superficial* anesthesia. Naturally, he gives more of the anesthetic. To his great chagrin the breathing becomes progressively more stertorous. The cyanosis which was at first slight, deepens. The noisy breathing attracts the surgeon's attention. The perspiring anesthetist is enjoined to push the jaw forward; but the spasm of the muscles is too great. The teeth are pried apart, barbarous instruments are brought into play to pull the tongue forward. The patient has not received sufficient air all this time—his face is slate-colored. The nasal or pharyngeal tube, tongue traction, oxygen, artificial respiration with rhythmic chest compression, stretching of the sphincter ani, all follow in an illogical onslaught, until finally a long deep breath is induced and the victim is resuscitated. The condition was one of *respiratory-collapse*. The cause was crowding of the anesthetic.

Respiratory Collapse

When Shall the Patient be Declared Ready for Operation?

As soon as the first, unimpeded, snoring respirations are heard, the cleansing of the field of operation may begin. If the cleansing manipulations do not disturb the rhythm of the snoring respiration, the rate of the pulse does not increase and the patient makes no defensive movements, he is very likely already in the proper plane of anesthesia. Note is at once made of the state of the pupil and lid corresponding to this plane.

Initial Incision

When the surgeon makes the initial incision observation is again made as to whether the rhythm of the respiration and the rate of the pulse remain undisturbed and whether the patient continues to be passive; if this is the case, the patient is considered to be in the correct plane of anesthesia—the plane in which he must be kept throughout the operation.

Of course, it is clear that the depth of the narcosis must, in a measure, be proportionate

to the magnitude of the awakening impulses set up by the surgeon's manipulations. In abdominal work these impulses are more intense near the solar plexus of nerves, that is, in the upper part of the abdomen. Traction on the mesentery or the introduction of long gauze tampons into the abdominal cavity for "walling off" sets up powerful awakening stimuli.

Awakening Stimuli

Maintenance of the Surgical Plane of Anesthesia.

In order to conduct a narcosis scientifically one must know the signs of sufficient anesthesia and the signs of awakening.

The respiration is studied by watching the movements of the chest or abdomen, by placing the hand in the vicinity of the nostril to feel the respiratory current of air, or, best of all, for the respiration is rarely noiseless, by listening to the breathing. The quality of the breathing is noted. The faintest indica-

Respiration

tion of a snoring respiration means that the surgical degree has been reached. Any change in the quality of the breathing compels the questions "Has the patient escaped from the proper surgical plane?" "Is the anesthesia too deep or too superficial?" or "Is the change simply a *respiratory reflex* induced by the surgeon's manipulations?"

Color

The color of the *ear* is a most useful guide. This does not hold good of the color of the forehead. The forehead in some individuals becomes cyanotic with slight changes of posture. The ear is not so subject to postural influences and is therefore a less misleading indicator of the venous condition of the blood. Even a slightly bluish tinge of the ear demands attention. Usually, crowding is the cause, and a little more air allows the normal red flush to return. Slight pallor developing during the course of the narcosis should always be regarded as a danger sign. It means that the patient is in profound anesthesia, and that the heart is threatening col-

lapse. The mask should be removed promptly and the patient allowed to breathe pure air. As long as the pulse is not weak or irregular one need not worry about the outcome.

Pulse

There are some advantages in choosing the temporal pulse as the guide, instead of the radial pulse, which is ordinarily followed; occasionally the temporal can still be felt when the radial has become impalpable. The pulsation of the temporal artery is best felt by placing the index finger flat over the tragus into the depression at the root of the ear. The pulse is important because it tells how the heart reacts towards the anesthetic and the surgeon's manipulations. The *frequency* is not very important. Exceptionally, it may be 120 or 130 during the greater part of an anesthesia without vital significance, if the *quality* is good. A diffuse and weakening pulse is a signal that the narcosis is too profound and that the heart is in danger of collapse. A somewhat irregular pulse may immediately precede or accompany the act of vomiting, and it is not a cause for alarm.

Accessory to the respiration, color and pulse, but of lesser significance, are the pupil, the cornea and eyelid, and the secretions.

Pupil

In patients *who have not received morphine before narcosis* the pupil is, as a rule, a guide of some importance. If the pupil is narrow, examination of its reaction to light is generally superfluous. A wide pupil, however, often means one or the other extreme of narcosis. A wide pupil which reacts promptly to light indicates superficial anesthesia; the patient may need more of the anesthetic. A wide pupil which reacts to light sluggishly or not at all means that the danger line has been overstepped; the anesthesia is too deep; the patient must have air. Without knowledge of the reaction, every markedly dilated pupil should be looked upon as prognostic of danger.

Cornea

To touch the cornea repeatedly with the finger for the purpose of obtaining the corneal reflex, is a bad habit. The reflex can be tested just as satisfactorily by shifting the eyelid gently across its surface.

A point worth remembering is that in the morphine-anaesthol (or morphine-chloroform) anesthesia the corneal reflex may remain quite active, while with ether it soon becomes feeble or extinct.

Eyelid

A useful indicator of the degree of muscular relaxation is, I believe, the tonicity of the eyelid. The usual arm test is very misleading. Flexing the elbow once or twice may give the impression that the muscles are thoroughly relaxed, and yet, on repeating the manipulation five or six times one may be surprised to obtain a sudden, powerful contraction of the biceps, showing that the patient is still not fully under the influence of the narcotic.

Normally the upper lid has a certain tonicity. If it is lifted gently by means of the superimposed ball of the finger it springs back to its natural position promptly. When the patient is fully under the influence of the anesthetic, this tonicity is partly or completely lost and the lid returns sluggishly to its natural position, or not at all. The patient can sometimes be kept in a proper surgical

plane by giving a few drops of the anesthetic each time as the tonicity returns, and ceasing when relaxation of the eyelid is obtained.

Secretions

When the patient is under anesthesia to the surgical degree the activity of the salivary, sweat and tear glands ceases. The accumulation of mucus in the mouth, the appearance of a tear in the eye, beads of perspiration on the brow all mean that the anesthesia is becoming superficial, that more anesthetic is required. It is worth bearing in mind that these indicators of the depth of narcosis do not, in all individuals, react in exactly the same way. While initiating the narcosis the anesthetist can get his bearings in regard to this point, and watch for any individual idiosyncrasy which may exist.

Individual Idiosyncrasy

It is unsafe to concentrate the attention on one sign, lest the general aspect of the patient be overlooked.

The anesthetist watches *constantly* the rhythm and quality of the breathing, the color of the ear and the character of the pulse. From time to time, only as occasion demands,

he refers to the accessory signs for confirmation. Should he, at any time, be in doubt about the depth of the narcosis, the first step is always to desist from giving more of the anesthetic until he has regained his bearings or the signs of awakening are recognized.

Some Important Reflexes.

Pharyngeal Reflex

(1) *Pharyngeal reflex.* Coughing does not necessarily indicate awakening. It usually means that the vapor of the anesthetic is too concentrated and irritates the air passages. "Holding the breath" occurs even in fairly deep narcosis and has the same significance. The treatment is to dilute the anesthetic by admitting air.

Ano-respiratory Reflex

(2) *Ano-respiratory reflex.* The crowing inspiration heard during operation on the perineum or rectum, *does not indicate that the patient should have more anesthetic.*

Splanchnic Reflex

(3) The reflex produced by traction on the gall bladder or mesentery is similar in its

significance to that of the ano-respiratory reflex.

Vomiting During Anesthesia.

Vomiting

It may happen to the conscientious anesthetist, who desists from giving more of the anesthetic until he has regained his bearings, that the patient suddenly shows signs of awakening, and vomiting begins. This is a disagreeable, but generally not a serious interruption. The anesthetist is absolute master of the situation. Although the patient's face turns somewhat blue during the vomiting efforts, the anesthetist *should not attempt to push the jaw forward or exert traction on the tongue.* The face is merely turned to the side and kept in position by placing the hand on the check. The mouth and pharynx are cleansed gently with a piece of gauze and the anesthetic is continued, drop by drop. It is often surprising in such cases how rapidly the patient can be brought back into the proper plane of anesthesia. There need be no fear that the patient will fully awake.

Obstructed Breathing.

Many anesthesias are unsatisfactory because the breathing is obstructed. To my mind the prime cause of obstructed breathing is too great a concentration of the anesthetic. The importance of avoiding the *crowding of the anesthetic* is the secret of a good narcosis.

The irritability of the air passages varies greatly in different individuals. Concentrated vapor may cause reflex spasm of the larynx and, consequently, obstructed breathing. This is the condition that leads to what is ordinarily called *respiratory collapse.* It is due to crowding—undue concentration—rather than excessive quantity of the anesthetic. If there were no superior laryngeal and trifacial nerves to warn the inexperienced or inattentive by closing the larynx to more of the anesthetic, real *respiratory paralysis,* which is apt to be fatal, and is due to direct toxic action of the anesthetic on the respiratory centre, might be more common.

Concentrated Anesthetic

"Have I crowded the anesthetic?" is the first question that should be considered when there are signs of obstructed breathing. The jaw is rigid, the patient is almost awake, and yet the mask is lifted to admit more air. Paradoxical as it may seem, the jaw begins to relax, the breathing becomes free and the anesthesia at once more profound. The reason is simple. As long as the spasm of the larynx persists the anesthetic cannot readily pass the barrier to exert its physiological action. As soon as the spasm is overcome by admitting air the anesthetic can be freely inhaled. By observing the precaution to dilute the anesthetic generously with air pharyngeal irritation and laryngeal spasm can be avoided and an undisturbed narcosis secured

Sometimes, however, the obstruction is purely mechanical. It may be due to compression of the trachea by a shoulder brace. In aged individuals, after removing the tooth plate, progressively increasing cyanosis may be due to *valve-action of the lips*. Expiration is unhindered, but inspiration becomes im-

Valve-action of the Lips

possible on account of collapse of the lips and cheeks. The difficulty is overcome by turning the head to one side and placing a spindle of gauze in the dependent angle of the mouth to keep the lips apart.

Recession of the Tongue

There are other cases in which the base of the tongue drops back into the oropharynx, and hinders breathing. There is a peculiar, noisy, "fluttering" respiration which indicates this condition. The jaw-grip, that is, pushing the jaw forward, is often insufficient. Most of us have been taught to use the wedge, mouth-gag and tongue forceps at once in such an emergency, but it is certainly desirable to escape this maneuver whenever possible. A naso-pharyngeal catheter, or breathing tube of soft rubber, passed through the nostril into the pharynx sometimes instantly relieves the obstruction.

The Use of the Breathing Tube.

The breathing tube is a soft rubber tube 5/16" in calibre and 7¼" in length. The

end is smooth and beveled and has an opening, there being a second opening on the side, about a quarter of an inch distant. To introduce it, the tip of the nose is lifted and the rounded end of the catheter directed into the larger nostril perpendicularly to the face. The use of a little white vaseline obviates friction and unnecessary traumatism. The tube is pushed gently back into the pharynx behind the receded base of the tongue until the respiratory air streams freely through it. Very rarely, it is necessary to pull the tongue forward until the tube is in position. At times it is of advantage to support the angle of the jaw lightly, in order to get the full benefit of the tube breathing. Oxygen, it is true, improves the color when the tongue has receded and there is partial asphyxia, but no one will argue that it *eliminates the cause of the obstruction*, viz., that the base of the tongue has dropped back into the pharynx and occludes the way to the air passages.

Breathing Tube

Sometimes, when the recession of the tongue is slight, supporting the angle of the

jaw helps, because the base of the tongue is carried forward with it. Frequently, this is insufficient. The tongue may be drawn forward by means of forceps or suture, but this method is crude and necessitates also the use of a wedge and mouth gag. The same accessories are imperative, when an attempt is made to introduce a breathing tube *through the mouth* into the pharynx. It is for these reasons that the nasal route is preferred. The method outlined is uncomplicated—its efficacy is often striking. It seems to be the simplest solution of the problem to re-establish the respiratory air channel, which has been occluded by the recession of the tongue.

Indications for Stimulation During Narcosis.

The volume of the pulse diminishes during protracted narcosis. The volume may be expected to decrease about one-third in the

course of an hour, and as much as one-half in a two hours' anesthesia. If, in *a chloroform or anaesthol anesthesia*, the pulse gives the impression, to the palpating finger, of having lost more than one-half of its original volume, stimulation is indicated. If ether feeding through the Schimmelbusch mask, and one drachm of 25% camphor-ether hypodermatically do not improve the volume notably, an intravenous infusion of physiological saline at 98°-105° F. should be given without delay. *If the anesthesia has been conducted with ether instead* of anaesthol or chloroform, camphor-ether stimulation is not in place; the resort is to strychnine stimulation instead—one twentieth of a grain of strychnine sulphate hypodermatically, which may be repeated in half an hour. If there is no prompt improvement in the condition of the pulse, the intravenous infusion should not be postponed. It must also be borne in mind that, not drugs, but infusion of fluid alone can make good any *great* loss of blood.

Volume of the Pulse

Camphor-Ether

Strychnine

Venous Infusion

The Influence of Morphine on Narcosis.

Morphine

During the course of any operation, the surgeon is responsible for a long chain of ingoing impulses, which travel along the sensory paths from the site of operation to the spinal cord and brain. Morphine diminishes the awakening effect of these impulses by benumbing the perceptive centers in the brain. The correct plane of anesthesia for a patient who has had morphine, for example, one quarter of a grain of morphine sulphate hypodermatically half an hour before narcosis, must appear very superficial as compared with a case to which morphine has not been administered. Not only is considerably less of the anesthetic required, but the lid, for instance, may be quite tonic without indicating that more of the anesthetic is necessary. These observations apply cardinally to anesthesias with chloroform, or chloroform combinations, such as anaesthol.

General Course of the Anesthesia.

The ideal narcosis is tranquil. It resembles a natural sleep. The breathing is unimpeded and easy. Any change in the character of the breathing sound, or the rhythm, demands attention. If, for the moment, the anesthetic has been given too hurriedly, a few breaths of air will restore the calm. If, on the other hand, signs of awakening are discovered—the lid becomes more tonic, the corneal reflex more active, a tear appears in the eye, the patient begins to sweat, saliva collects in the throat, the pulse becomes more rapid—a few drops of the anesthetic should be administered until the desired free and unembarrassed respiration returns.

Tranquil Narcosis

Awakening.

If the narcosis has been conducted correctly the patient should become conscious promptly after operation. The premonitors of awakening are readily recognized, the

corneal reflex becomes more active, the tonicity of the eyelid approaches the normal, a tear may appear in the eye, beads of perspiration are seen on the forehead, the patient may begin to mutter incoherently, the pulse becomes faster, the breathing loses its snoring character, and the patient begins to move his head.

Termination of Narcosis

If the operation is a laparotomy and the patient is under the influence of morphine-anaesthol, the narcosis is terminated by giving a drop occasionally when the surgeon puts his first sutures into the abdominal wall; after the fascial repair, the anesthetic is stopped entirely. The narcosis may be so timed that the patient becomes conscious and responds to questions promptly after the last stitch has been placed.

If the morphine-anaesthol narcosis has been continued with *ether* by the drop method, as is frequently indicated, and if considerable ether has been used, the patient will be a little tardier in arousing, and the administration of the narcotic should be stopped at an earlier period. To be less abstract, in the case of a

laparotomy the anesthetist desists at once from giving ether when the surgeon has applied the *peritoneal suture* for the closure of the abdominal wound.

Recession of the Tongue After Narcosis.

Post-operative Asphyxia

Sometimes, especially in individuals who show this tendency during narcosis, a marked obstruction in breathing is met with, attended by increasing cyanosis, a condition due to dropping back or recession of the base of the tongue into the laryngo-pharyngeal space. Changing the position of the head does not improve the breathing, the jaw cannot be pushed forward because the masseter is rigidly contracted and the teeth are clenched tightly. To draw forward the tongue would require a rough procedure, with wedge, gag, and forceps. If a soft rubber catheter or the breathing tube be passed through the nostril into the pharynx the respiratory air streams freely through the tube.

Post-Operative Distress.

Gas-Pain

Post-operative gas pain is often the source of great distress to patients who have undergone the ordeal of laparotomy. It is due to a temporary paresis of the gut and consequent distension with gas. When the trouble is in the lower bowel considerable relief may follow the insertion of the rectal tube. Irrigation of the colon, when permissible, may stimulate peristalsis in the higher segments of the bowel. A routine intended to militate against intestinal paresis in celiotomies, and worth a fair trial, is to administer with the morphine sulphate a small dose of eserine sulphate hypodermatically. For the ordinary adult the dose should be about one-fourth of a grain of morphine sulphate and one fiftieth of a grain of eserine sulphate given subcutaneously one-half hour before narcosis.

Vomiting

When it is important to avoid post-operative vomiting, gastric lavage with plain water, made faintly alkaline with lime water or milk of magnesia, may be done as soon as the

narcosis is ended and while the patient is still on the operating table. During the procedure the head end of the table is lowered a few degrees.

I have gathered the impression that *crowding* is one of the prime causes of excessive vomiting after anesthesia. It has been my experience that cases in which I could truly say that I had not crowded the anesthetic and where it was not swallowed to any extent during the induction, have suffered little or not at all from this disagreeable after-effect of the narcosis.

The attentive nurse will find that there are numerous little things, seemingly insignificant, that help greatly toward the patient's comfort. She may support the wound during a coughing spell or if the patient vomits. If her charge is tormented with nausea a piece of cotton saturated with a mixture of alcohol and acetic acid can be dropped into a tumbler and the patient allowed to inhale the vapor. If the lips and throat are dry and parched, moisture is grateful and small pieces of gauze wet with

Nausea

Thirst

iced water may be laid over the lips and nostrils.

Pain

If the patient is suffering after operation, one should be generous with morphine. It should always be given hypodermatically. To the adult less than one quarter grain as a dose is of little avail. In such post-operative use there need be no fear of inculcating the morphine habit.

Morphine-Anaesthol Sequence.

For general use in every day practice the morphine-anaesthol sequence already described is most satisfactory.

As indicated, the adult receives a quarter grain of morphine sulphate hypodermatically one-half hour before anesthesia.

Anaesthol

Anaesthol, a fairly stable combination of chloroform, ether and ethyl chloride in molecular proportions, is given by the drop method, but in slightly greater quantity than pure

chloroform. For the average "interval" case of appendicitis, for example, about 15 to 20 cc. should be used for the induction, and 40-60 cc. for the entire narcosis.

Morphine Breathing

The morphine, in susceptible individuals, sometimes causes very shallow respirations so that the conduct of the anesthesia to the stage of unconsciousness becomes prolonged because the patient does not inhale sufficient of the anesthetic at each breath. Crowding would be incorrect. The solution is patience, and a little *ether* to excite deeper respirations. The patient has but a slight stage of excitement, often none at all. The narcosis is continued until the first unimpeded, snoring respiration is heard, and then the surgeon may begin. Much of the narcotic is not required and the anesthesia can be so conducted that the patient promptly becomes conscious after the placing of the last suture.

After-effects

Post-anesthetic distress is, on the whole, less marked than with pure ether. Not infrequently there is neither nausea nor vomiting.

Minor Anesthesia with Ethyl Chloride.

Office Anesthesia

In surgical office work, there is occasionally the need of a rapid and fleeting anesthesia which does not necessitate the use of a cumbersome apparatus for its induction. In these cases, in place of chloroform, anaesthol or ether, the ethyl chloride spray can be used on the Schimmelbusch mask already described. It produces a prompt anesthesia during which an abscess can be opened, washed and dressed without causing the patient the slightest pain.

Intubation Anesthesia.

In intubation anesthesia, or tube anesthesia, as it might be called, the patient does not receive the anesthetic directly from a cone or mask. It is inhaled through a soft rubber tube which is introduced into the pharynx through the nostril or mouth. It is most successful in cases that do not require a

very profound narcosis. It is indicated in operations on the head, enabling the anesthetist to be at a distance from the field of operation and out of the surgeon's province.

An important preliminary is to give the patient morphine sulphate, gr. 1/4, hypodermatically one half hour before anesthesia is begun, as much less of the anesthetic is then required.

Intubation Narcosis

The method is simple. The anesthesia is carried to the surgical degree in the ordinary way with anaesthol or chloroform. A soft rubber catheter with an opening at the end and side, and varying in diameter between 1/4 and 3/8 inch, is made smooth with sterile vaseline and then passed through the nostril down into the naso-pharynx for a distance of about 7 1/4 inches in the adult, to the vicinity of the larynx. If the respiratory air streams freely through the tube it is assumed to be at the proper level and the tube is anchored and held in place by making a single turn of zinc oxide adhesive plaster about it, near the nostril, and fastening the ends to the cheek. It is im-

portant that these straps adhere firmly and the skin should therefore be cleaned with a little ether or chloroform before they are attached. This naso-pharyngeal tube must now be connected with a second tube, the *conducting tube*, to which a perforated funnel covered with gauze is attached, or which is dipped into a tumbler containing loosely packed gauze; the conducting tube should lie by the side of the patient, beneath the sterile sheets and it should be so long that the anesthetist can sit at the foot of the operating table to administer the anesthetic.

Catheters, a piece of rubber tubing, some zinc oxide plaster, and a tumbler containing some gauze, are, therefore, all that one needs in order to improvise, in a few minutes, an adequate intubation apparatus. In practice, simplicity is frequently important.

Cocainization of the Pharynx

Cocainization of the pharynx is an unnecessary procedure.

For operations on the mastoid or brain the pharynx need not be tamponed about the tubes. This is done only when blood is apt

to flow down into the air passages, as in resecting the upper jaw, in Kocher's excision of the tongue and various *intrabuccal* operations.

In such cases, the Roser mouth gag is inserted and the tongue drawn gently forward out of the way, while, aided by the index finger of the right or left hand, a piece of gauze tampon is placed snugly about the naso-pharyngeal tube or tubes. If a stream of expiratory air issues from the tube it is certain that the pharyngeal openings in the tube have not been plugged by the tampon or tenacious secretions. In certain operations on the nose where *both* nostrils are involved it becomes necessary to introduce the tubes through the mouth—oro-pharyngeal intubation.

The Surgical Plane

The anesthetist need not be at sea, although he is at a considerable distance from the face and eyes, which he is accustomed to watch with such care during narcosis. In any case, the *pupil* is no longer a very useful guide because the patient has received morphine. There is access to the pulse at the wrist or the

Pulse

dorsal artery of the foot and its regularity and quality can be noted. A *diffuse* and *weakening* pulse wave is at once appreciated as a danger sign—too much chloroform—and the tube should be disconnected from the funnel to admit pure air, until the pulse has recovered its quality.

Color and Breathing

The color of the face can be observed; also the breathing movement of the chest and abdomen, and the respirations are readily heard through the tube. Any change in the character of the breathing or any hindrance in inspiration or expiration is readily detected. From time to time the funnel is disconnected and fluid which may have accumulated in the tube, as for instance condensed anesthetic, is allowed to flow out.

Clogging of the Tube

Secretions clogging the pharyngeal end of the tube are expelled by "milking" the tube, that is, forcing an occluded column of air through it by stroking it between the finger and thumb in a direction towards the patient, or allowing a gentle stream of oxygen to flow into its lumen.

As long as the breathing remains unembarrassed and regular, the pulse is of good quality and a general, passive condition maintained, the patient is in the normal plane of surgical anesthesia and any interference would be meddling.

Cases Requiring Superficial Anesthesia.

(1) Suprapubic prostatectomy and cystotomy after the skin incision is made.

(2) Nephrectomy in general, but espeially in tuberculous and enfeebled women.

(3) Mastoid and brain operations.

(4) Osteotomy and operations on the extremities.

(5) Curettage and obstetrical manipulations.

Cases Requiring Anesthesia of Moderate Depth.

(1) Trachelorrhaphy, Colporrhaphy and perineorrhaphy.

(2) Stretching of the sphincter and hemorrhoid operations.

(3) Resection of the rectum by the perineal or sacral route.

(4) Perineal prostatectomy.

(5) Inguinal and femoral herniotomy.

Cases Requiring Profound Anesthesia.

(1) Gynecological laparotomies: salpingo-oophorectomy and hysterectomy.

(2) Operations on the stomach or gall-bladder: gastro-enterostomy, cholecystectomy.

(3) Orthopedic manipulations necessitating complete muscular relaxation: reduction of congenital dislocation of the hip.

Conclusion.

Anesthesia is a science which deserves more attention.

The extensive use of ether and the experience that its incautious administration is fraught with but little immediate danger, has gotten the hospital interne into reckless habits which cling to him in practice. There the anesthetist finds himself frequently compelled to use chloroform, a narcotic many times more powerful than ether. In the hands of the inexperienced, and above all, the inattentive, chloroform is certainly a dangerous drug. But this does not detract from its great value as an anesthetic and it would be illogical to condemn its use.

In the aged, we know that it is not so much the operation itself as the broncho-pneumonia that often follows the anesthesia which deserves grave consideration. Chloroform, or a chloroform-ether combination, such as anaesthol, is undoubtedly, in such cases, preferable to pure ether, because it causes less bronchial

irritation. In the morphine-anaesthol-ether sequence which I have tried to outline, chloroform and ether are blended in a way most adequate for anesthesia, and the system is so flexible that it readily adapts itself to an anomalous case.

The difficulties in respiration so frequently encountered, even by the experienced anesthetist, find a natural solution; if he has been studying the case he will be able to judge whether the trouble is due to crowding or to a mechanical cause.

I have no hopeful word for the anesthetist who is inattentive. Whether the case is an apparently simple or a critical one, it should be remembered that the good anesthetist, like the good surgeon, is he who, besides being competent, has a conscience, and feels his responsibility, who appreciates that *there are some who are anxiously awaiting the outcome, and have a deep interest in the life that is in his hands.*

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